

# OPERATING INSTRUCTIONS

for Vertical Autoclave

KSG 30/50-1  
KSG 40/60-1  
KSG 50/70-1  
**KSG 50/80-1**

- single-walled execution -

**with**  
sterilization timer and contact thermometer  
**only for unwrapped and not porous solids**

Modifications reserved. 23.03.06  
51XEUMXX.XXX – **S-No. 7280**  
Electric diagram No. **01E030501EU001** / (2002 - 1a)  
Wiring diagram No. **1415 - 3**

KSG Sterilisatoren GmbH  
Buchhoferstraße 5  
82140 Olching  
Federal Republic of Germany  
Phone: +49-8142 / 2957-0  
Fax: +49-8142 / 40384  
E-mail: [info@ksg-sterilisatoren.de](mailto:info@ksg-sterilisatoren.de)

## **CONTENTS**

<b>1.</b>	<b>Legend.....</b>	<b>3</b>
<b>2.</b>	<b>Description.....</b>	<b>4</b>
<b>3.</b>	<b>Technical Data .....</b>	<b>5</b>
<b>4.</b>	<b>General Remarks.....</b>	<b>6</b>
<b>5.</b>	<b>Installation .....</b>	<b>7</b>
<b>6.</b>	<b>Operating Instructions .....</b>	<b>8</b>
<b>7.</b>	<b>Safety Devices .....</b>	<b>13</b>
<b>8.</b>	<b>Table.....</b>	<b>15</b>
<b>9.</b>	<b>Maintenance of Sterilizer .....</b>	<b>16</b>
<b>10.</b>	<b>Search on Errors .....</b>	<b>18</b>
<b>11.</b>	<b>Short operating Instructions .....</b>	<b>19</b>

## 1. Legend

- 1 Sterilizing chamber
- 2 Sterilizer lid with swivel bow
- 2a Operation handles for (2)
- 3 Gasket
- 4 Water level indication with protective covering
- 5 Water level valve, top
- 6 Water level valve, bottom
- 7 Function safety valves (with exhaust tube)
- 8 Operating lever for (7)
- 9 Switch box / electrical control case
- 10 ON/OFF switch / main switch
- 11 Control lamp "Operation/Sterilization" (white)
- 12 Control lamp "heating" (yellow)
- 13 Control lamp "water shortage" (red)
- 14 Sterilization timer
- 15 Sterilization thermometer
- 15a Temperature sensor for 15
- 16 Contactor for (20)
- 17 Water shortage protected switch for (17a)
- 17a Water shortage sensor with micro radiator
- 18 Adjusting device for sterilizing pressure with regulation
- 19 Safety valve (with exhaust tube)
- 20 Plunger-type radiator (2x)
- 21 Emptying valve for rapid pressure release
- 22 Automatic condensate trap
- 23 Return flap
- 24 Inlet valve for cooling water
- 25 Pressure gauge for sterilizing chamber (1)
- 26 Emptying valve for sterilizing chamber (1)
- 27 Apparatus feet with fixation holes
- 28 Connection for cooling water
- 29 Connection to waste water (drain)
- 30 Cooler

### **Remark:**

All valves are in closed position when they are moved clockwise  
- seen on the operation handle –  
until the limit stop.

## **2. Description**

Name and address of manufacturer:

**KSG Sterilisatoren GmbH**  
Buchhoferstraße 5  
D-82140 Olching

Tel: 08142/29 57 0  
Fax: 08142/40 38 4  
E-Mail: service@ksg-sterilisatoren.de

Order No. **175280**

Aukl-No. **Aukl 002 076**

Apparatus No: **7280**

Year of construction: **2005**

Operator

**Full mark of steam sterilizer:**

KSG 30/50-1  
single-walled  
electrically heated

Aukl 002 040

KSG 40/60-1  
single-walled  
electrically heated

Aukl 002 066

KSG 50/70-1  
single-walled  
electrically heated

Aukl 002 068

**KSG 50/80-1**  
single-walled  
electrically heated

**Aukl 002 076**

### 3. Technical Data

Type	Chamber Diameter	Chamber Height	Chamber Volume	Usable Chamber Volume	Current	Capacity	Operating water until NW	Operating water NW until HW
30/50-1	30 cm	50 cm	068 dm <sup>3</sup>	035 dm <sup>3</sup>	10,0 A	06,5 kW	11,5 Litre	07,5 Litre
40/60-1	40 cm	60 cm	110 dm <sup>3</sup>	075 dm <sup>3</sup>	14,5 A	09,5 kW	21,4 Litre	11,6 Litre
50/70-1	50 cm	70 cm	184 dm <sup>3</sup>	137 dm <sup>3</sup>	19,0 A	12,5 kW	32,0 Litre	28,0 Litre
50/80-1	50 cm	80 cm	200 dm <sup>3</sup>	157 dm <sup>3</sup>	19,0 A	12,5 kW	31,0 Litre	09,0 Litre

Operating pressure  $p_e$  : 2,5 bar

Operating temperature: 134 °C

Nominal voltage: 230/400 V AC + N + PE

Current: Alternating current

Nominal frequency: 50/60 cs

NW = Low water

HW = High water

## **4. General Remarks**

- 4.1. Feeding water:** for operation of the sterilizer either distilled or demineralized water is necessary.
- 4.1.1. Please have a look at intermission 2. Technical Datas regarding information about the filling quantity of the steam jacket-operating water by empty chamber from the minimum water level indication (NW) until the highest water level indication (HW).
- 4.1.2. The switchboard (9) with command, operating and indicating elements (see legend 10-18) makes it possible to operate the sterilizer acc. to the operating instructions and the control of the programme.
- 4.1.3. 2 radiators (20).
- 4.1.4. Water shortage sensor (17a) with micro heating element 0,5 kW and water shortage protected switch (17), resettable.
- 4.1.5. Regulator and adjustor for sterilization pressure (18), max. 2,5 bar.

## **5. Installation**

- 5.1.** Read the operation instructions before setting the apparatus into operation.
- 5.2.** Take care that the power supply is in accordance with regulations, see name plate.
- 5.3.** Take care that the electric power supply satisfies the valid regulations on site.
- 5.4.** **Attention:** main switch to be installed on site
- 5.5.** Prepare cold water connection for cooling.
- 5.6.** Take care that there is a water outlet (e.g. gully) under the sterilizer for the waste pipes of the sterilizer.
- 5.7.** To guarantee the stability of the sterilizer, the apparatus feet (27) have to be fixed to the ground.
- 5.8.** If the sterilizer is not used, please close the inlet valve "cooling water" (24)

## **6. Operating Instructions**

For setting the sterilizer into operation, please proceed as follows:

### **6.1. Control of feeding water**

Level of feeding water (distilled water or demineralized water) has to be between the markings for minimum and maximum water level. Should this not be the case, the chamber (1) has to be filled with a corresponding quantity of water. This is done by filling in water through the opened lid (2) when the chamber is empty and depressurized. Care has to be taken that the max. marking is not exceeded.

- 6.1.1. Control emptying valve (26), if necessary, close it. Fill in distilled or demineralized water into the open chamber (1) until water level (4) has reached the max. marking.

### **6.2. Loading of the sterilizer**

- 6.2.1. Please clarify the sterilizing goods acc. to sterilizing temperature and time ( table 8).
- 6.2.2. If necessary / scheduled, put the solid sterilizing goods into the corresponding baskets (accessories). **Do not use packages or boxes.**
- 6.2.3. Place the sterilizing goods into the sterilizing chamber and put them on the ground plat resp. on the trays (accessories). The chamber can be filled up until its upper edge.

### **6.3. Closing of the lid**

- 6.3.1. After the loading of the chamber, please close the lid (2).
- 6.3.2. To that end turn the lid by the operating handles (2a), counter-clockwise until the limit stop and fix it in this position.
- 6.3.3. Then tilt the lid downwards until it lies on the gasket (3).
- 6.3.4. Afterwards please turn the lid by means of the operating handle (2a) in clockwise direction until the limit stop (view from top).
- 6.3.5. At last close the function safety valve (7). You have to press the operating lever (8) of the function safety valve (7) from its horizontal position to the top into the slit of the operation handle (2a).

### **6.4. Heating of sterilizer - Heating-up time**

The saturated steam necessary for sterilization is produced in the chamber by means of two electric heating elements (20). To start the heating process, please proceed as follows:

- 6.4.1. Execute control acc. to point 5.1
- 6.4.2. Close emptying valve (21).
- 6.4.3. Adjust the contact thermometer (15) to the adjusted set value acc. to table 8.
- 6.4.4. Adjust (wind up) the sterilization timer (14) to the necessary sterilizing time.
- 6.4.5. Adjust/control sterilizing pressure at the pressure regulator (18) to the set value acc. to table 8.
- 6.4.6. Actuate the green ON/OFF switch (10) to "ON" position (control lamp lights up green). During the started heating process the adjusted sterilizing temperature is reached after approx. 30 - 45 min., if the boiler is filled up to max. During the heating-up time the heating is in operation. This can be seen by the yellow control lamp "Heating" (12).

## **6.5. Sterilization**

The heating-up process is finished when the sterilizing temperature adjusted at the contact thermometer is reached in the chamber.

The sterilizing phase is indicated by the white control lamp "Sterilization" (11). During this phase heating is switched off and sterilization timer is in operation.

In case that boiler temperature falls below the value adjusted at the contact thermometer (15), the sterilization timer (14) is switched off, the white lamp "Sterilization"(11) goes out and the yellow control lamp "Heating" (12) is illuminated, while the heating elements (20) are in operation until temperature is reached again.

This procedure is repeated until sterilizing time resp. sterilization timer (14) has run down.

***Attention:*** The sterilizer lid (2) is hot during operation !!!

## **6.6. End of programme - reduction of chamber pressure**

After the end of the sterilization time (indication "0" minutes at the timer (14)) the sterilizing programme is finished. The electrical radiators (20) are then switched off automatically. The sterilized goods can be removed after pressure reduction in the sterilizing chamber. This pressure reduction can be effected in different ways, acc. to requirement resp. demand ( see table 8).

- 6.6.1. By self-cooling of the whole sterilizer. This is done automatically, when the electric heating is out of operation after the sterilization timer has run down.
- 6.6.2. By rapid reduction of pressure from the sterilizing chamber by opening the emptying valve (21) carefully. To cool down the escaping steam before it enters the drain system, please open the inlet valve for cooling water (24) for the cooler (30) until a mixed temperature of max. 70 °C is reached at the entrance into the drain system. This procedure must be maintained until the pressure of the sterilizing chamber is "0" bar - to be seen at the pressure gauge for the sterilizing chamber.

## **6.7. Removal of the sterile goods**

After pressure reduction, indication "0" bar at the pressure gauge (25) for the sterilizing chamber, the sterilizer lid (2) can be opened and the sterile goods can be removed, if the temperature at the contact thermometer (15) has decreased to approx. 60 °C. The cooling valve (24) can be closed again.

- 6.7.1. For opening the sterilizer lid (2) the function safety valve (7) is opened by the operation lever (8) (operation lever has to be placed into horizontal position). Thus the remaining overpressure now escapes from the sterilizing chamber via the exhaust tube of the function safety valve..

**Attention:** It is still possible that steam escapes at the exhaust tube of this valve.

- 6.7.2. By means of the operation handles the lid is turned until the limit stop and then opened.

**Attention:** It is still possible that hot steam damps escape from the sterilizing chamber.

- 6.7.3. Now the - possibly still hot - sterile goods can be removed.

## **6.8. Preparation for further sterilizations**

When a sterilization has been ended acc. to point 5.6.2, the sterilizer can quickly be prepared for the next charge, as it is still heated up from the first cycle.

- 6.8.1. Close the following valves (if open):
  - Emptying valve for sterilizing chamber ( 21)
  - Cooling valve (24)
- 6.8.2. Control the water level of the chamber at the water level indication (4), if necessary fill in distilled or demineralized water acc. to point 5.1.
- 6.8.3. Adjust resp. control the required pressure adjustment at the pressure regulator (18).
- 6.8.4. Load the chamber with the goods to be sterilized.
- 6.8.5. Close the sterilizer lid (2) as described under 5.3 - 5.3.5.
- 6.8.6. Adjust the sterilization timer (14) acc. to 3.4.4

By adjusting the sterilizing time at the timer (14) the electrical radiators (20) are again switched on and the steam necessary for the next sterilization is produced.

***Remark:***

- a) The timer remains in waiting position and only starts again, when a new sterilization has been initiated (acc. to 5.5).
- b) If necessary, the timer adjustment can be changed in direction "0" minutes. In "0"min position the electrical radiators are switched off.

## **6.9. Switching off of sterilizer**

For final switching off of sterilizer, e.g. after the last cycle of a day, switch off ON/OFF-switch (10) - green lamp goes out - and adjust sterilization timer (14) to "0" minutes. It is recommendable to switch off the main switch and to close the valve for cooling water (24) as well as the main cock for cooling water on site.

## **7. Safety Devices**

### **7.1. Water shortage in the chamber**

Above the radiators (20) a sensor (17a) is built into a micro heating element, so that they cannot burn through in case of extreme shortage of distilled or demineralized water. In case of water shortage the temperature sensor - heated up by the micro heating element - gives a signal to the water shortage protected switch (17a). Via a contactor (16) this switch separates durably the radiators (20) and the small radiator in the water shortage sensor (17a) from electric current. At the same time the red control lamp "water shortage" (13) lights up. Due to the falling temperature the sensor (15a) switches the sterilization thermometer (15) to undertemperature. Thus the sterilization timer (14) is stopped and the sterilizing cycle is interrupted. The goods to be sterilized have to be considered as not sterile and to be sterilized again..

For removing the water shortage open carefully the emptying valve for quick steam reduction (21). Before open the cooling valve (24) correspondingly - see 6.6.2.

After pressure reduction in the chamber has been effected (pressure gauge (25) for the sterilizing chamber must be "0" bar), the sterilizer lid (2) can be opened as described under 6.7.1 - 6.7.2 and the water level can be increased acc. to point 5.1. Afterwards the sterilizer lid (2) has to be closed - see 6.3 - 6.3.5.

After having closed the lid and the temperature in the boiler water - and thus at the water shortage sensor (17a) has dropped down, the "reset"-button of the water shortage protected switch (17) has to be pressed. Now the red lamp "water shortage" (13) goes out. The sterilizing programme is started again, if the main switch 810) has not been switched off. In any case the adjustment of the sterilization timer (14) has to be controlled and, if necessary, increased to the required value.

## **7.2. Function safety valve**

When the sterilizer lid is orderly closed, this valve (7) prevents by its operation lever (8) that the lid can be opened when the sterilizing chamber is under pressure. If anyone tries to open the chamber nevertheless, the lever (8) has to be operated first. This would mean that via the activated valve (7) possibly existing pressure would be reduced and be led away via the exhaust pipe.

## **7.3. Sterilizer lid**

The sterilizer lid is locked with the sterilizer by a groove and tongue profile, so that an opening of the lid is impossible when there is an inner pressure. Should the lid be opened - due to an accumulation of malfunctions (defective function safety valve or wrong operation) - when there is still a remaining pressure inside the chamber, this inner pressure presses the lid into the mechanical locking position, before it can be opened completely. Due to the arrangement of the groove and tongue profile the remaining pressure can escape between chamber and lid, but a dangerous flying open of the lid is surely prevented.

## **7.4. Overpressure safety device**

If an inadmissible high steam pressure > 2,5 bar resp. an inadmissible high chamber temperature > 138° C is produced - due to a simultaneous defect of the pressure regulator (18) and the contact thermometer (15) or too high values adjusted by the operator - the safety valve (19) reacts. Due to the high inner pressure of the chamber the locking mechanism of the safety valve (19) is opened. The steam can be reduced via the exhaust tube, so that an inadmissible high inner pressure in the chamber can be prevented.

In case of reaction of the safety valve (19), switch off the apparatus by the ON/OFF switch (10) and control especially the adjustments of pressure regulator (18) and contact thermometer (15).

## **7.5. Working of the sterilization timer**

The timer (14) only considers the real sterilizing time. This means that it only starts its operation when the temperature adjusted at the contact thermometer (measured by the stream sensor of the contact thermometer). At the same time the white control lamp (11) "Operation/Sterilization" is illuminated.

At the scale of the timer you can see the remaining time necessary for a proper sterilization process., if the timer had been adjusted acc. to table 8.

## **7.6. Gravitation stream procedure**

The air inside the sterilizing chamber is removed by the steam streaming in and let off via the automatic ventilator (22). Depending on the temperature this part automatically closes at a stream temperature of approx. 100° C and higher, thus making it possible that the steam pressure is produced in the chamber.

## 8. Table

Programme	Goods to be sterilized	Sterilizing pressure	Sterilizing temperature	Sterilizing time	Method of cooling
A	Utensils Instruments Plastic goods	1,2 bar	121 ° C	30 Min.	Quick steam reduction or self-cooling
B	Utensils Instruments	2,4 bar	134 ° C	10 Min.	Quick steam reduction or self-cooling

### Sterilizing goods

In the program "A" (1,2 bar / 121 ° C) only solids may be sterilized in not packed form, not porous and are not in the form of tube with a sterilizing temperature of 121 ° C - 125 ° C.

In programme "B" (2,4 bar / 134 ° C) only solids may be sterilized in not packed form, not porous and are not in the form of tube with a sterilizing temperature of 134 ° C - 137 ° C.

## **9. Maintenance of Sterilizer**

- 9.1.** In case of external contamination, clean the apparatus moistly. When the switchboard is cleaned, separate it first from mains supply.
- 9.2.** The chamber must always be kept clean. If necessary, wash it out, let off the liquid via the emptying valve (26) and rinse.
- 9.3.** If the water of the chamber becomes turbid (to be seen at the water level glass (6)), it can be led off via the emptying valve (26) for the sterilizing chamber (1).
- 9.4.** In case of calcareous water, the apparatus has to be decalcified once a year. These intervals can be extended when the sterilizing chamber is emptied regularly.

## **9.5. Sterilizer gasket**

- 9.5.1. In course of time the sterilizer gasket (3) is subject to a natural wear and tear and has to be exchanged, if necessary, e.g. if it is deformed or damaged or if during sterilization steam escapes at the gasket.
- 9.5.2. To achieve a longer durability of the door gasket and to guarantee a safe tightening between chamber and door blade, the silicone gasket must be controlled and maintained continuously. The door gasket must be removed from the gasket groove in regular intervals and be cleaned. As the grease loses its separating ability also when the unit is not used, the maintenance intervals depend not only on the frequency of use, but also on the blocking resistance of the chamber gasket.
- 9.5.3. Cleaning of the gasket should be done when the unit is cold. For protecting the hands, the use of one-way rubber gloves is recommendable.
- 9.5.4. The gasket is removed from the gasket groove (lid of the sterilizer open). Then the gasket has to be cleaned by a fluff-free cloth and afterwards to be checked, whether there are no wear and tear spots or damages. A defective or worn-out gasket has to be replaced.
- 9.5.5. Afterwards the gasket groove must be cleaned. For greasing the gasket, take a small quantity (approx. the size of a walnut) of grease on the palm of one hand and rub it between both palms, before you draw the gaskets through your hands. Then put the greased gasket back into the gasket groove.
- 9.5.6. The blocking resistance of the gasket must be checked before each setting into operation when the sterilizer is cold.
- 9.5.7. We recommend that you always dispose of a spare gasket, as a defective gasket makes it impossible to operate the unit and causes an unnecessary stop.

## **10. Search on Errors**

### **10.1. Temperature indication does not work**

- sensor defective
- flowing obstructed
- condensate conductor defective

### **10.2. No pressure in the chamber**

- no water in the chamber
- no current / fuse defective
- water shortage protection disengaged

### **10.3. Chamber gasket leaky**

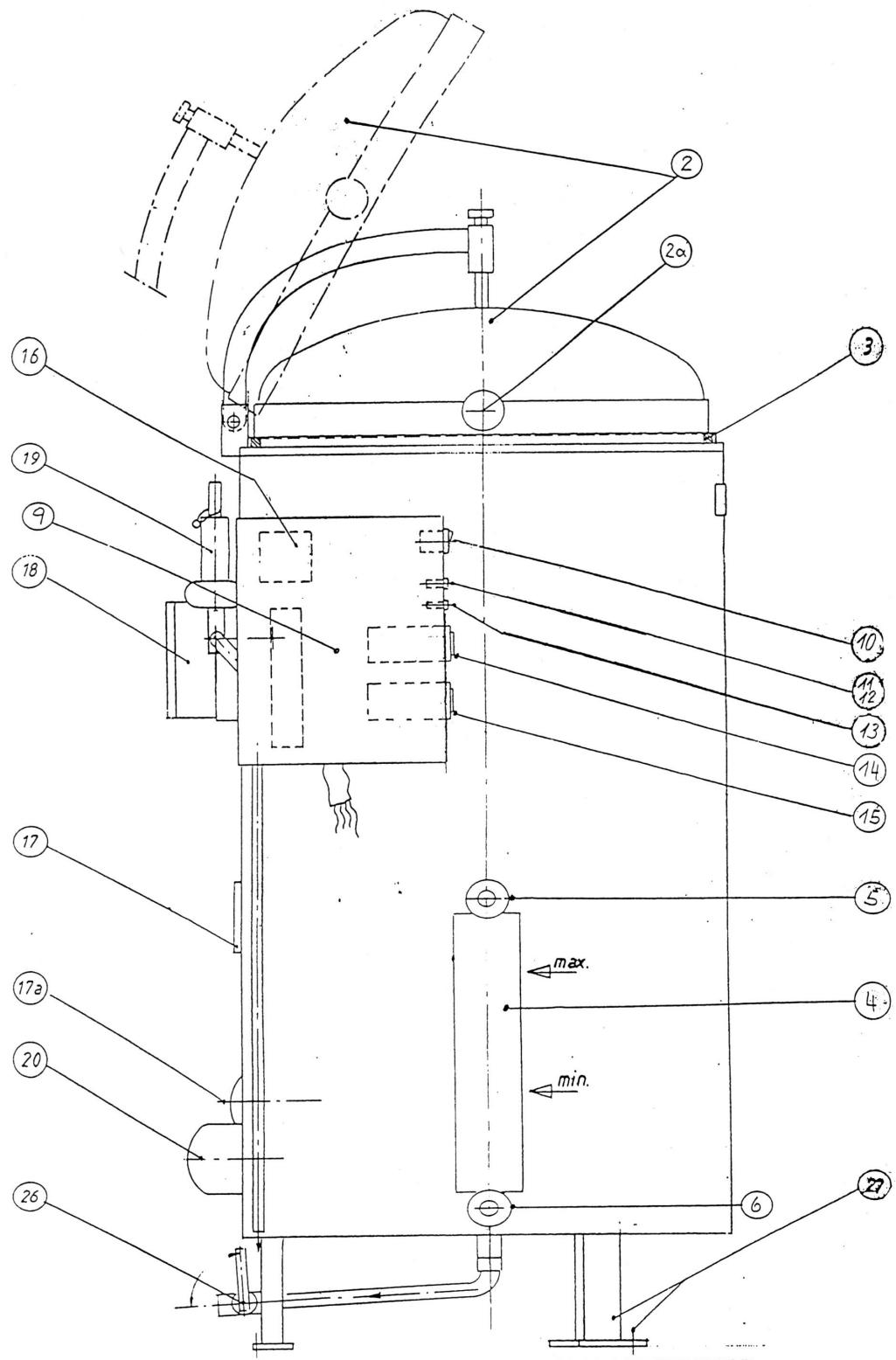
- gasket defective
- dirt on the gasket
- gasket has to be greased

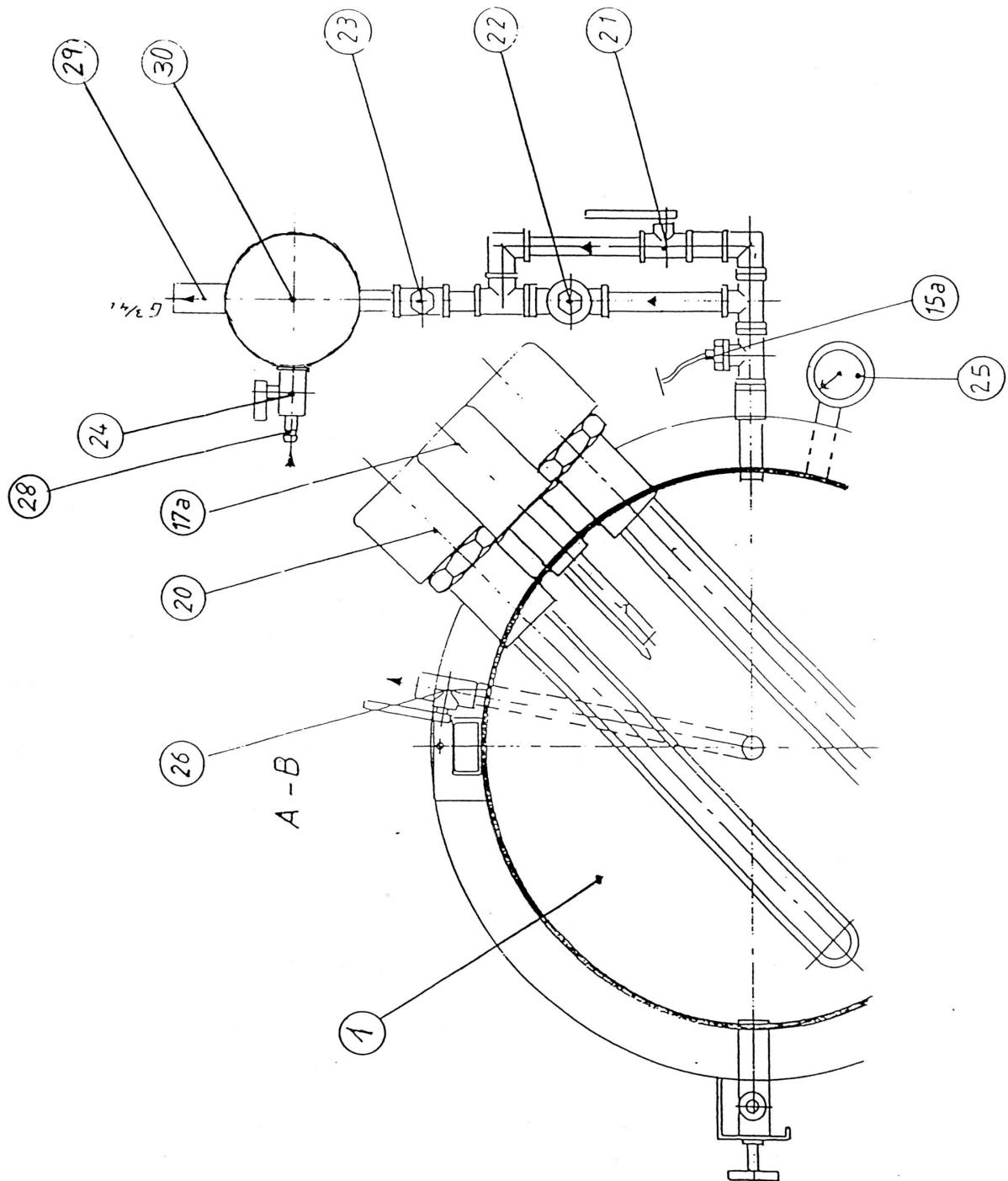
## **11. Short operating Instructions**

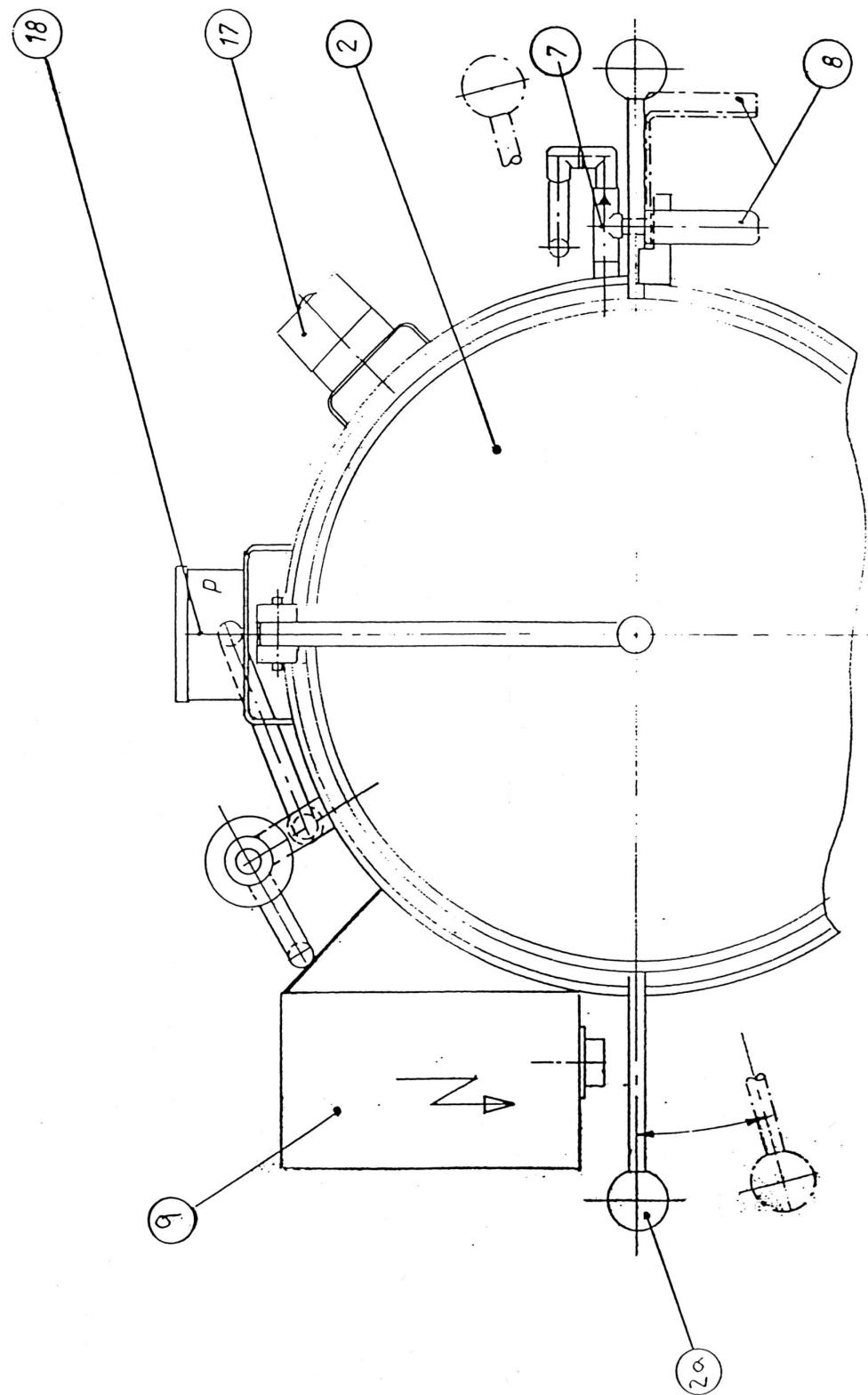
for vertical autoclave KSG 30/50-1 - KSG 40/60-1 - KSG 50/70-1 KSG 50/80-1 with sterilizing timer and contact thermometer

**Operation of the unit acc. to the short operating instructions may only be done by persons who understood the operating instructions and are in a position to operate the unit accordingly.**

- 11.1.** Fill the apparatus with distilled water over the middle of water level indication.
- 11.2.** Close the emptying valve for quick pressure reduction.
- 11.3.** Load apparatus with goods concerning table 8 to be sterilized and close lid.
- 11.4.** Switch on the apparatus by ON/OFF switch.
- 11.5.** Adjust the pressure at the pressure regulator.
- 11.6.** Adjust the temperature at the contact thermometer.
- 11.7.** Adjust the sterilization timer.
- 11.8.** After the sterilization open the cooling valve and afterwards carefully the emptying valve for quick pressure reduction.
- 11.9.** When there is pressure equalization in the chamber, open the function safety valve at the operation lever.
- 11.10.** Open the sterilizer lid and swivel it to the top.
- 11.11.** Close the cooling valve and remove the goods from the chamber.







# Betreiber

---

<b>Expotech USA , INC</b>	A-Nr. 175385 vom 07.04.05	15.04.05
Mr. Kern Griffin	<b>S-Nr. 7280</b>	
10700 Rockley Rd.	K-Nr. 45415	
Hosteon TX 77099-3519	<b>Aukl-Nr. 002 067 50-80-1</b>	
	mit Uhr, Kontaktthermometer	
Fr. Schumacher	E-Plan <b>01E030501EU001</b> (Nr. 2002-1a) und R-Plan (Nr. 1415-3)	
D:\ENG\VERT1\51XEUMXXXX\51xeumxxxx-mit Legendenzeichnungen - 10.11.03.doc		

---